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THE TRADE AND INDUSTRIES OF WESTERN SOUTH AMERICA*

II

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HAVING discussed the general industrial and commercial conditions of western South America as a whole, it will be profitable to examine the temperate and tropical regions separately and with some detail. The temperate division of the continent, for the purposes of this discussion, may be considered practically co-extensive with Chile; for although the northern boundary of Chile extends beyond the Tropic of Capricorn, the aridity of that part of the country makes mining the only industry. Mining industries being independent of climate, the activities of Chile that are determined by climate are located within the temperate zone. Chile is long and narrow, but her area is large, larger in fact than that of France, Germany, or the United Kingdom, or the combined area of the New England and Middle Atlantic States with Maryland and the Virginias added. Her length of 2,600 miles would reach from New York to Utah. The country extends from a tropic district to Tierra del Fuego, where the latitude and climate are like those of Scotland. Nitrate of soda is the chief product of the arid northern part of Chile, which is the source of supply for the entire world.

*Figures 1, 2 and 3 are from photographs loaned by Mr. Wilfred H. Schoff, of the Philadelphia Commercial Museum.

The agricultural districts and the centre of population are farther south, the products being similar to those of our Pacific coast states, with which Chile possesses many points of similarity.

The temperate shores of the Pacific show a succession of similar geographic and climatic features in both North and South America. These resemblances would appear plainly if Chile could be inverted and placed beside the coast of North America. The lower end of the inverted Chile would be opposite the City of Mexico, and Tierra del Fuego would be about the latitude of Sitka, Alaska. The 800 miles of Chilean desert with its nitrate beds would lie against the arid coast of Mexico where its silver is mined. Patagonia would be opposite British Columbia and Alaska, both regions being damp, fringed with rugged islands, and cut into sharp fiords walled in by forest-clad mountains having snow fields on their summits and glaciers on their sides. The tropical and cold sections are unproductive agriculturally, but in the temperate belt of each region, civilization and diversified industry are possible. The climate is that of western Europe and the United States.

It is by comparing the productive region of the north temperate Pacific with the south temperate Pacific that the greatest resemblances and likewise the differences of the two coasts appear. Their difference is due to the absence of a South American duplicate for the State of Washington. California and Oregon are reproduced, but the Antarctic current sweeping up the coast of South America, shortens the temperate section of Chile so much that the region corresponding to the State of Washington is replaced by a longer continuation of the rugged and forest-clad coast similar to that of Alaska and British Columbia.

Near the Mexican boundary of the United States the resemblances to the corresponding agricultural parts of Chile are obvious. In Chile, the arid country, by means of irrigation produces grapes and raisins, citrus and other fruits, and alfalfa, the alfalfa being used as a supplementary fodder for cattle pasturing on the higher hills. The arid belt extends several hundred miles, and is succeeded on the south by wheat fields and general agriculture. The Chilean forests corresponding to those of central and northern California, Oregon, Washington and British Columbia exist in the lower half of the Chilean agricultural region and along the extensive coast of Patagonia.

The best section of the western slope of both Chile and the United

States is found in a large interior valley. The valley of California, bounded on the east by the Sierra Nevada, on the west by the Coast Range and drained by the Sacramento and the San Joaquin rivers is of high fertility. Chile also has a valley similar to this, but larger and superior to it in several particulars. It is inclosed by the Andes on the east and by a coast range near the shore of the Pacific; but this coast range is not so continuous as that of California, being broken at frequent intervals where rivers make their way to the ocean. Instead of being drained by two rivers flowing lengthwise, and having outlet to the sea, the Chilean valley has several small rivers flowing across it and discharging into the ocean. The basins of these rivers are not separated by high divides, but are practically continuous, so that the whole district is properly spoken of as one great valley. The Andes are higher than the Sierra Nevadas, and westerly winds bring a larger amount of moisture than California has. The streams have a larger and more constant flow of water from the mountain snows and furnish an abundant supply for irrigation, and in some places provide good power.

As in most arid countries where irrigation can be practiced, the soil is fertile. The crops produced are identical with those of California. All of the cereals, vegetables and fruits thrive and provide a food supply sufficient both for the present and prospective home demands and for a large export trade. This valley is about 700 miles in length, a distance equal to that from New York to Charleston, and is divided into thirteen prosperous provinces, which had a population in 1895 of 2,400,000 people, as many as there were in California, Oregon and Washington, in the census year 1900. California has less than ten persons to the square mile, while the Chilean valley has from three to five times as many, and is about equal in density of population to Maine, New Hampshire and Vermont, or to our southern states, exclusive of Florida.

The great trunk line of the government railway that goes through most of this region from north to south, is being extended in both directions and will eventually connect Coquimbo in latitude 29° with Porto Mont in latitude 41°. The line to the last point is already surveyed. This road, most of which is now completed, will be about 1,300 miles long, and will connect with many branches and private lines from the various mining and agricultural centres. The several rivers breaking through the coastal mountain range make it easy for the railroad to connect with seaports, and

there are now railway lines to six harbors giving the producing centres of the country opportunity to take advantage of the water transportation supplied by the lines of coasting steamers that are doing a large business in both directions. In the valley of California the coast ranges make necessary a much longer railway haul to reach the ports.

The northern part of the agricultural region, the district around Valparaiso and Santiago, is older and more fully developed. Of this section the Aconcagua valley, which may be taken as a type, is a plain highly irrigated and famed for its agriculture. The grape crop of this valley alone, it is estimated, would make a million gallons of claret wine were it so used instead of being manufactured into the local drink called *chica*. Potatoes are exported to the nitrate deserts of the North and to Panama; alfalfa hay to Brazil, and honey and wax are sent to Europe. Local canneries preserve the fruit crop which is mainly marketed in other sections of the country. There is pasturage on the neighboring hills above the level of irrigation where a peculiar kind of wiry grass, well adapted to its dry surroundings, grows for months after a soaking rain.

The sides of the Andes throughout this whole belt are forest-clad. In latitude 37° S., the forest growth becomes general and the country is similar to many parts of the eastern United States. This latitude is now the Chilean industrial frontier, the opening up of the region having been recently begun as the result of the advent of better means of transportation. New railroads are being built, forests are being cleared, stock raising and cereal agriculture are increasing. The forest regions have tanning industries, sole leather being exported to Europe.

The agricultural and mining regions of Chile are north of 40°; south of that there is as yet practically nothing of commercial importance except the sheep pastures of Tierra del Fuego. The thousand miles of intervening coast is as little known as is the coast between the port of Vancouver and the mainland of Alaska. Nearly all of the present and prospective Chilean commerce and population are from one thousand to two thousand miles north of the Straits of Magellan, through which their commerce must find its way to the Atlantic, until the canal provides a shorter outlet.

Chile exported something over 3,000,000 bushels of grain to Europe in 1898–9, but the larger part of the exports of the country consists of the minerals mined in the northern and arid part of the

State. The agricultural part of the country sends large quantities of food products to the mining regions of the northern provinces. The greater part of Chile's export wealth originates in regions that are almost a desert. Their dryness causes their richness; indeed, a moist climate instead of being a blessing, would cause the disappearance of the greater part of the wealth of this section which consists of such soluble minerals as nitrate of soda, iodine, borax and common salt.

Nitrate of soda, the chief export of Chile, lies in a nearly continuous deposit parallel to the seacoast, extending 150 miles from

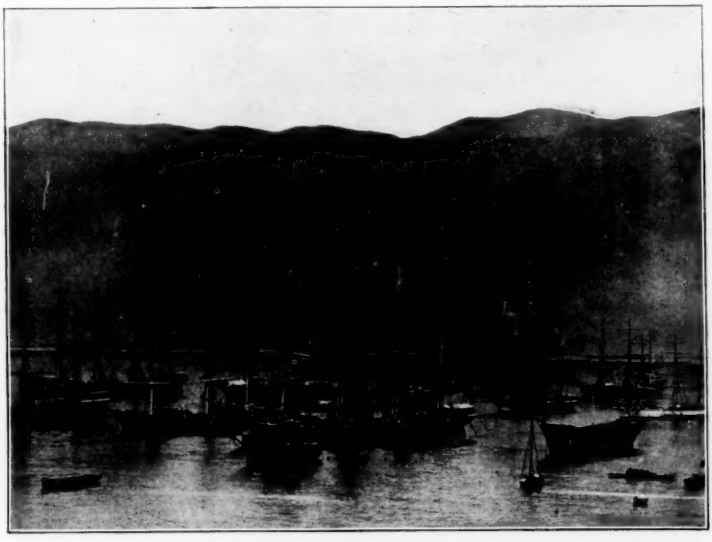

FIG. 2. NITRATE SHIPS IN THE HARBOR OF IQUIQUE, CHILE. THE NITRATE ESTABLISHMENTS BEGIN AT THE TOP OF THE CLIFF AND RUN FROM TEN TO FIFTY MILES INLAND.

north to south, with scattering deposits reaching 250 miles farther, the total covering 220,356 acres, and estimated to contain about 228,000,000 long tons, a quantity sufficient to last the world for many decades to come. The nitrate is found under the surface layer of sand, and when shovelled out has the consistency of cheese. It is refined in numerous and extensive plants requiring large capital. The crude product is dissolved, chemically treated, and crystallized

to get rid of the impurities. Among these impurities are iodine and common salt, which are separated for export.

The City of Iquique, the most important nitrate port, may be taken as a type of the towns that depend upon the nitrate industry for their existence. Here 30,000 people having the conveniences of a modern city live in the desert, where every supply for man and beast must be imported from other ports of Chile or from foreign countries. Water for the city is brought by pipe line 200 miles from the Andes. A railroad zigzags up to the plateau and winds around among numerous nitrate works situated in the desert. The railroad company is English, and most, though not all, of the nitrate plants are owned by foreigners. Borax is obtained in the dry districts, and in some places common salt is taken from the surface of the earth by sawing it out in cakes that are handled like ice. Besides these desert mineral products, the same region contains a large amount of copper, silver and lead. Antofagasta is the port of this section and is also the outlet for the mines of Bolivia, which ship their antimony, bismuth, tin, mercury and sulphur over the Antofagasta railroad. Most of these products are in the form of ores, some of which are refined at Antofagasta, and the rest exported, mostly to Europe, for treatment.

The rise in the price of copper has greatly increased the copper mining industry of Chile, and the deposits of copper promise to contribute largely to the world's supply of this metal. Low grade copper ores have been found in abundance in the district about Santiago, near to the ocean. Copper now ranks second among Chile's exports, amounting, in 1899, to 25,400 tons. In coal Chile has an asset that will assist in the development of other resources, although she has small prospects of ever becoming a coal exporter. In the south, about latitude 37°, the ports of Coronel and Lota are the points of shipment for mines located near by. The deposits are large, but the quality is inferior to English and American coal, and the output is insufficient for home demands, although it is largely used by steamers going up and down the coast and to Europe.

THE ISTHMIAN CANAL AND THE TRADE OF THE UNITED STATES WITH CHILE.

The interest of the American people in the commerce of Chile is greater than our present share of that trade would indicate. The foreign commerce of Chile now amounts to about $100,000,000 and

is increasing. In 1899 the exports were $59,000,000, and the imports, $39,000,000; about nine-tenths of the imports came from Europe, while nineteen-twentieths of the exports went to that continent. Our trade is slight compared with that of the United Kingdom, Germany, or France. An examination of the elements of the trade of Chile shows why the canal will increase our share. Of the Chilean exports, nitrate of soda comprises nearly 60 per cent., although the percentage is slightly declining, owing to the increased export of copper and copper ores. Next in the order of importance come silver and silver ores, then wheat and barley, wool, hides, and other scattering agricultural and mineral products, most of which are needed in the United States. We need the nitrate for our fertilizers and chemical manufactures, we have the coal to smelt the copper and silver ores, we need the wool for our carpet manufactures and the hides to furnish raw materials for our leather manufactures. Of course, the grain products are needed only in Europe.

Of the Chilean imports, cotton manufactures comprise by far the largest part. Then come machinery of all kinds, kerosene, woolens, coal, bagging and all kinds of miscellaneous manufactures and supplies. The cotton manufactures are made from the raw material grown in the southern part of the United States, and carried to Europe for manufacture whence the goods are shipped through the Straits of Magellan. Much of that cotton cloth will, in the future, go direct from American mills *via* New York, Charleston, Mobile, or New Orleans and save trans-shipments and seven thousand miles or more of transportation. We have the materials and manufacturing ability to furnish the Chileans their machinery; we are now furnishing them with kerosene, and, when the canal is opened, we will probably be able to send them coal and many miscellaneous manufactures.

The reduction of freight rates that may be expected to follow the opening of the canal will not only extend our present trade with western South America, but will increase the number of the articles that enter into it. With a few exceptions, the goods Chile secures in this country are those which we produce under especially favored circumstances; lard, lumber, kerosene, breadstuffs, patented articles, like medicines, firearms, electrical appliances, farming machinery, and improved hardware. These articles can be sold readily in Chile after the canal has been opened. We have just begun to send Chile iron and steel. The bulk of the pig, bar and hoop iron, rails and

castings now come from Europe, although we can make them more cheaply than our European rivals can. The railroads of Chile have iron rails that must soon be exchanged for steel. The towns and cities of Chile will use an increasing amount of structural iron for building purposes. The growing favor of electricity in a country having many mountain streams for water power is opening up a demand for electrical machinery which American manufacturers are already able to supply. We are sending small quantities of many other articles in which transportation is a large factor, such as earthenware, glass and glassware, cordage, paper and coal. Our cotton exports to Chile consist mainly of one or two plain staple grades made without reference to the Chilean market, and shipped in bulk as chance opportunities occur. With attention to the demands of the market and cheaper transportation, that business can be greatly extended.

It is probable that some of the trade of the western part of Argentine lying on the east slope of the Andes will be handled through Chilean ports and will use the canal. The foothill provinces of Argentine, like those of Chile, produce fruit, wine and grain, and form a prosperous region. This region being from seven to nine hundred miles from the Atlantic ports of Argentine, and within two hundred miles of the ports of the Pacific which, when the canal has been opened, will be much nearer North America than Buenos Aires, the mails, passenger traffic, express business, and some classes of freight may be taken across the Andes and sent north from Valparaiso or some other Chilean port. A boundary controversy has delayed the completion of the trans-Andean railroad, but contracts have been let for the completion of the work.

TROPICAL SECTION OF WESTERN SOUTH AMERICA.

GENERAL DESCRIPTION.

The tropical section of western South America is nearly double the area of the temperate Pacific region, and includes practically all of Bolivia, Peru, Ecuador and a part of Colombia. In this discussion of the industries and trade of Pacific South America, however, the portion of each of these states is omitted that lies in the almost unexplored forest plain extending eastward from the Andes. The region here considered has an area of nearly half a million square miles. It is more than twice as large as France, is greater than our Middle Atlantic States and Southern States east of the Mississippi

River, and is equal to our three Pacific coast states, with the addition of Idaho, Wyoming and Colorado.

The region consists of a coastal plain and a high plateau. The plain is either matted with tropic vegetation and drenched with rain, or is a sandy desert, and neither of these conditions favors the establishment of communication with the plateau 30 to 100 miles inland, which must be surmounted by ascending a steep and forbidding mountain wall. The mineral wealth of the plateau is abundant, but is at present available only to a small extent.

FIG. 3. THE LARGEST COPPER SMELTING PLANT IN PERU, LOCATED AT CASAPALCA.

This South American region has a population of over 6,000,000, but is made up chiefly of Indians and half-breeds, with a comparatively small proportion of the dominant Spanish race. The latter race lives in the towns, devoting itself to political and mercantile affairs, the proportion of Spanish blood decreasing as the distance from the towns increases. All the labor of the country is done by the half-breeds and Indians, or by imported Chinese and Japanese

labor. Industrially, the South American Indian is said to be superior to the North American Indian and when properly supervised to be nearly equal to the negro as a laborer. The social and economic conditions do not tend to make the laborers ambitious. Some of the natives own the lands from which they glean a living; but throughout Ecuador, Peru and Bolivia, a system of industrial servitude exists that places the majority of the laboring classes in a condition similar to that of the English serf in the Middle Ages. The laborer is in debt to his employer, who manages to keep him so. Theoretically, every man can work for whom he wishes, but the debtor is practically prevented from changing masters by legal difficulties.

The Andean region of South America now has but little international trade, because the development of its natural resources has been prevented by untoward political conditions, by the mountainous character of the country, and the absence of an isthmian canal.

THE PERUVIAN COAST. ITS INDUSTRIES AND THE EFFECTS OF THE CANAL UPON THEM.

Taking Guayaquil as a centre, it will be found that the coast running eight hundred miles to the north of it includes a coastal plain sparsely populated by a few Indians and negroes who can inhabit its unwholesome forests. To the south extends some twelve hundred miles of seacoast known as the "Zona Seca," or dry zone, which has considerable industry at present, has had more in the past, and promises to be the scene of greater activity in the future.

The Peruvian coast for twelve hundred miles is too dry for ordinary agriculture. Regular crops can be raised only by irrigation, the supply of water being the rainfall on the Andean slopes at an elevation of 7,000 feet and more. During the winter months, the fifty streams crossing the plain are raging torrents, overflowing their banks, but during the heat of the summer they dry away to mere rivulets, only two of the northern ones having sufficient depth to be of any use for navigation.

If the Peruvian coast had abundant rains, it would be so malarious and unwholesome as to be unsuitable for white men, whereas its climate is said to be healthful, and cooler than that of other regions in the same latitude, owing to the Antarctic current flowing up the west coast, and to the sea breezes.

The Peruvian coast is desolate except where irrigation has produced green fields in the dry plains. Its present population, and

the amount of land cultivated are doubtless much smaller than they were before massacres, slavery, and white men's diseases, particularly smallpox, had greatly reduced the native population.

The soil in this coast plain is fertile when irrigated, and well-suited to the production of sugar, cotton and rice. Experts claim that sugar can be produced here as cheaply as in any other place in the world. The sugar industry, indeed, had made a good start before 1885 when the desolating war with Chile destroyed many of the plantations. The business has now recovered, 110,000 tons having been produced during the seasons of 1898 and 1899. This was nearly all taken by the United States, and much of it crossed the isthmus.

The cotton crop of this section is one in which the United States is particularly interested. Some of the valleys of the north, particularly those of the Piura and Chira rivers, grow a peculiar kind of rough fibre cotton of a reddish color, that will not grow in any other part of the world, and is valuable because it mixes well with wool. The irregular supply of about 10,000 tons a year grows largely without cultivation along the rivers. At the present, the United States imports much of this cotton by way of Liverpool. We can use many times as much of this product as we now receive, and its cultivation can be largely extended by the introduction of proper irrigation works.

Some rice is exported from the port of Trujillo; and farther south, at Pisco, there is some shipment of the wine and grape products which grow in the irrigated orchards near the Andes. Aside from these crops, however, the agricultural products of this plain will be used to supply food products for the Peruvian population.

As agriculture advances there must be a reorganization and extension of the railroads from the coast inland. Several lines now extend a short distance from the Pacific, but as industry and traffic increase these scattered pieces of roadway must be combined into one or two systems centering at a harbor or harbors that can be improved by the construction of piers suitable for the easy handling of the freight. When these improvements are made, they will require materials with which the United States is well supplied.

Petroleum fields are located near the Ecuadorean boundary at the west point of South America, the deposits lying along the coast for a distance of two hundred miles, extending inland a considerable distance, and reaching outward under the sea. The development of this resource has not met with much success up to the present time,

although the oil deposits are said to be rich. An English company is now operating there with an American director, and is securing a constantly increasing output which reached about 2,000 tons a month in May, 1900. Thus far only three or four square miles situated on the seacoast have been prospected, and that not thoroughly, in a field which is supposed to be extensive in area. The oil is not suitable for illumination, but makes a valuable fuel. It is used on all the railroads of Peru, and may give much assistance to the industrial development of the Pacific coast of South America.

(To be concluded.)

FIELD WORK IN PHYSICAL GEOGRAPHY

II

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LET it be further noted that every competent teacher should be left free to plan field work with due regard to local field opportunity, and hence that field exercises must vary greatly in different schools and that they should not be submitted to any uniform or rigid examination set by a state board of education. On the sea coast, field observations may be directed to a whole series of problems that are reached only through the text-book or the laboratory at a school in the interior of the country. A lowland district in a dry climate suggests different exercises from a mountain district in a wet climate. The piedmont district of the southern Appalachians, with its deep weathered soils and its normally developed drainage systems, could be more simply treated than the glaciated uplands of New England, where the irregularly distributed drift and the many special or abnormal drainage features will require a very ingenious treatment before the best advantage can be taken of them in elementary work. It would be a mistake to impose a detailed outline of work upon a teacher situated in any one of these districts, for real success requires that every competent teacher should plan local field work for himself; hence the following outline of a few items for autumn work in a Vermont high or normal school should

be taken as a suggestion and not as a prescription; as a beginning, and not as a whole course.

Autumn. General characteristics of the lands. (1) A weathering ledge; decomposition of certain minerals, action of temperature, moisture; products of disintegration; their rapid removal, chiefly by falling from steep rock faces which are thus left bare for continued active attack of the weather; here only lichens, etc., grow; the accumulation of fine waste on little rocky shelves which are thus somewhat protected from the weather; here plants of higher order gain a root-hold; yet even here slow down-slope movements (creeping) is caused by washing, and by changes of temperature, etc. The prevalent coarsely crystalline texture of the rocks, and the frequent occurrence of wrinkled foliated structures may be at once introduced as evidence that much material has already been removed from this region by erosion; for coarse crystalline texture and wrinkled foliated structure cannot be produced by any known processes that operate at the earth's surface; they are explained only by conditions that may occur at depths of many thousands of feet beneath the surface. Hence the visibility of such rock structures suggests that the surface has been worn down to them by the removal of rock masses that once covered them, probably to the depth of thousands of feet. In time the steep-faced ledge will be weathered back to such a slope that its waste will form a continuous cover over it; the waste will be cloaked over with plants, which delay but do not prevent its removal; the finer particles of waste directly on the surface will wash and creep down the slope fastest, while new fragments are slowly weathered off the ledge beneath the soil cover. If the processes of removal are very weak, so that less is removed from the outer surface than is added by weathering the rocks beneath the under surface of the waste cover, then the cover increases in thickness and thus decreases the effectiveness of under-weathering; if removal of waste at the surface is active, the waste cover is thinned and its slope is decreased, while under-weathering is accelerated; thus an essential balance in time comes to be struck between supply and loss, and the waste cover becomes a general and permanent feature of the surface. The flatter the surface is worn, the slower the removal of the waste, the finer its surface particles and the greater its depth. The piedmont district of the southern Appalachians exhibits abundant examples of this condition of things; their absence in Vermont must be considered later.

XUM

(2) A small stream. Explore and map its drainage area; note that its velocity is at every point just sufficient to dispose of the volume received; that it flows faster with a slender current on steeper slopes and slower with a stouter current on gentler slopes; that in a cross-section of a straight channel the current is fastest near the middle and at (or very close to) the surface; but in a curved channel the line of fastest current is displaced from the middle of the stream toward the outer side of the curve (convex side of stream, or concave bank); that the greater depth of the channel is usually nearly under the line of fastest current. Note the distribution of cobbles, gravel, sand, silt along the stream bed: how are these materials related to the velocity of the stream, and to the form of the channel? By attentively watching the stream bed, particles of waste may be seen dragged along the bottom; by studying the bed and the banks, inferences may be made as to the progressive action of the stream in the past and the future, and the origin of its present channel may be discovered. A second visit should be made just after a rain, when the stream is swollen, hurried, and turbid: this is the time when most of the stream's work is done; it has a vacation in fair weather. The waste is first received in great part from the banks, and it is supplied to the banks by washing and creeping from the adjoining hillsides; a very small part of its load of waste comes originally from its bed; but once in the power of the stream, the waste is slowly washed down the channel, making many stops on its way to the sea, sometimes being laid down in a bar, sometimes on the inner bank of a curve, to be taken up again for a further journey at some later time. Especially at time of flood is the channel scoured and the waste carried forward; as the flood subsides and the current weakens, the coarser waste is laid down first and the finer waste later. Trace a stream to its junction with another; note that the two streams come together at accordant grade. This is an almost universal relation, and is one of the chief arguments for the erosion of valleys by the streams that flow along them (see passage from Playfair, cited in Russell's Rivers of North America, p. iii). The long-continued action of streams must necessarily produce this relation; the occurrence of the relation proves the long-continued action of the streams. But the streams alone would cut vertical-walled trenches. The widely opened form of the valleys prevalent in Vermont, as indicated by the moderate slopes of the valley sides, suggests that a great amount of material must have been weathered and washed from them down

to the streams, and carried by the streams to the rivers and the sea; and thus some confirmation is found for the conclusion already stated, based on the texture of the rocks.

Most streams in New England exhibit alternations of rushing rapids on rocky ledges and slow-flowing reaches in meadows. In the reaches, the depth to which the channel is cut is controlled by the ledge at the rapids next down the valley; and the stream is just balanced between the average supply and removal of the waste. Farther deepening of the balanced channel can be allowed only as the controlling ledge is slowly worn down. So delicate an adjustment of the balanced stream to the ledge can only be the result of the stream's own action on its original valley. If the original valley up-stream from the ledge had too gentle a slope, the stream would have run slowly through it (or the stream might have been much delayed, as in a lake basin occupying a depression in the general path of the valley) and the channel (or lake basin) would have been filled up or aggraded with waste, thus producing the existing balanced slope. If the channel were originally of a stronger slope, the stream would have run more rapidly and would have worn down or degraded its bed until the present slope was gained. A channel that has a balanced slope may therefore be said to be *graded;* the stream may be said to be in a graded condition, or at grade; and the slope of the balanced stream may be described (in a slightly different sense of the same word) as having a steep or a gentle grade.

The ledge at the rapids is slowly worn or degraded chiefly by the rasping of waste over it at time of flood. Where a stream is actively deepening its channel in a ledge of weak rock (a rare condition in Vermont but common enough in New York), the channel is worn chiefly downward, and lateral wearing is at a minimum. Where a stream is flowing at a grade through a meadow, downward wearing is at a minimum and lateral wearing on the outer bank is at a maximum; as a result the meadow stream is constantly changing its channel by wearing away the outer bank, and laying down the wash thus gained on the inner bank of a curve further forward; a meandering channel is thus formed. Where the curves are well pronounced it may be noted that the wearing action of the stream is extended forward from the concave (outer) bank of a meander so as to include something of the up-valley side of the meadow lobe that enters the next meander; and that the depositing action is ex-

tended forward from the convex (inner) bank of a meander so as to include something of the down-valley side of the meadow lobe: hence the meander system is migrating down stream at the same time that it is wandering laterally. Much of the meadow or flood plain may have been worked over by the shifting stream, and hence it will be underlaid by stones and gravel such as are to-day found in the stream channel, however fine may be the silt that is strewn over its surface at time of overflow.

The ledge that determines a rapid serves as a local baselevel to the graded reach next upstream; that is, its surface determines a level base, to which the stream approaches very closely, but which it cannot quite attain. If no ledge occurs between the point of observation and the sea, then the stream will be graded with respect to the general baselevel of the ocean surface. Most rivers are to-day graded with respect to local or general baselevels; it is chiefly the smaller streams that are detained in ungraded lakes or hurried in ungraded torrents. This illustrates a general principle of wide application. Whenever the processes that are in operation upon a land form tend to change it to another form, then it cannot endure long, as the earth counts time: but when the acting processes tend to maintain the form, then it endures through ages. Lakes and rapids soon disappear by the action of their streams; streams that possess such features are young as the earth views them. Graded reaches persist, for they are self-perpetuating; streams that possess them are mature or old. The relatively short life of exposed ledges on hillsides and the long endurance of waste-covered or graded slopes illustrate the same principle.

Local illustrations of processes and principles, such as these just described, should be supplemented by citation of similar illustrations in other parts of the world. The teacher should possess a mental fund of such parallel illustrations, ready for instant use. He should also possess a well-selected series of book references, many of them representing notes made in his own experience of reading, to which the more assiduous of his students may be referred for fuller information. Every item encountered in the local field may thus be shown to have its fellows elsewhere in the world, and the value of the local field is thus greatly increased. In this way every local item comes to aid the conception of an ideal type, the generalized representative of a class which includes many distant examples as well as the local example through which its ac-

quaintance was first made. Field work thus becomes naturally associated with book work. As before noted, field work remains far below what it should be if it is limited merely to the observation of the examples that it immediately presents. If parallel illustrations cannot be found at once for some special local features, the editors of the JOURNAL will be glad to aid in their selection.

(3) Drift. The hills and valleys of Vermont, and of New England in general, possess abundant deposits of unconsolidated rock waste known as drift. Note the varied composition of these deposits; they frequently contain rock fragments unlike the rock in the neighboring ledges. The rock fragments are frequently firm and unweathered; they are sometimes (especially in valleys) rounded as if waterworn; sometimes (especially on uplands) roughly facetted and striated, as if dragged under heavy pressure. The structure and form of these deposits is very varied. Those containing facetted and striated stones or boulders are compact and unstratified, often wrapped over the rock hills as if packed upon them; sometimes reaching greater thickness and rising in oval hills of arched profile, independent of the rock beneath. Those containing rounded cobbles and pebbles, with sand, are stratified; they sometimes form small knolls or serpentine ridges; sometimes plains or terraces. The rock beneath the drift is usually firm and unweathered; its surface is often rounded and striated, as if it had been scoured under heavy pressure. Evidently, the normal processes of weathering have not been active here, as they have been in the southern Appalachians. In place of the regular and well-graded slopes of gentle curvature, cloaked with abundant waste derived from the underlying rock and always leading down to an elaborate branchwork of well-established water courses, such as must characterize regions where normal weathering has long been in progress, the hills and valleys of Vermont present irregular forms; ledges are exposed here and there in disorder, irregularly distributed drift deposits of varied thickness, structure and form lie on a firm and smoothed foundation of unweathered or little weathered rock; the hillsides descend unevenly to water courses that exhibit in their ponds and rapids the most evident signs of an early stage of development. All these abnormal features are to be attributed to glacial action, whose geographical consequences in the northern states are so numerous and so important that every student of physiography should gain an early acquaintance with them.

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As under weathering and streams, it is by no means advisable that every student should be expected to observe all the items here noted, or to formulate or invent for himself all the generalizations and explanations here quoted. The school year is too short for that. But there should be some observation, generalization, invention and discussion on the part of every student, and in supplement to this the teacher should add enough to carry the class through a carefully prepared course in the appointed time. In particular is it necessary that the various classes of facts that lead to the most important generalizations and that call for the most frequent fundamental explanations should be illustrated by some well-selected examples, and that these examples should become familiar to the students by direct observation. The students should thus be led directly to discover or to recognize the chief principles and general ideas of land physiography—gradation, baseleveling, etc.—while in the presence of the facts to which these principles apply. Only in this way can abstract principles gain real and serviceable application. If it occur to any readers of these pages that the topics here suggested for field observation and study possess some measure of difficulty, more perhaps than is usually associated with work on geographical excursions, let them be assured that the results are worth the effort they may demand; and that only as physiography gains a seriousness of work comparable to that in classics and mathematics will it acquire the educational position that it deserves.

If it be true that field work for the autumn months must be planned for each school district, it is still more true for the spring months; for attention should then be given to those topics of the text-books which find local illustration near the school; not merely general topics, such as the gradation of river courses, but particular topics, such as the development of flood plains, the migration of divides, and the evolution of certain land forms. Any little stream that possesses a flood plain between the enclosing side slopes of its valley, serves to review and to justify everything that has been learned about flood plains; the stage attained in the development of the actual flood plain should be determined with respect to the ideal scheme of flood plain development. Every divide from which the two slopes are unsymmetrical is presumably a migrating divide; what changes will probably be brought about in stream courses and waste slopes if the migration continue? What examples from other parts of the world may be illustrated by the observed example? As to

land forms, Vermont has an abundance of subdued mountains and of drift deposits; Kentucky illustrates the dissection of plains and plateaus in various stages; central Pennsylvania exhibits a beautiful variety of mountain ridges, with an extraordinarily well-adjusted drainage system; the Carolinas possess a beautiful variety of coastal features; Mississippi and Louisiana share the great flood plain of the "father of waters." Surely there is no lack of field material! Let us hear from the teachers who are making a success of their field work as to the examples of land forms that they are actually studying outdoors.

In closing, let me add a few more pieces of advice. While the field work in the fall leads up from various particular observations to several broad generalizations, the spring work should lead down from a broad scheme of classification to various particular examples that come under the scheme. Every observed fact should be associated with the class to which it belongs. As a member of this class, it should be compared with other members, known through the textbook or through outside reading, and representing earlier and later stages of development. Particular effort should be given to making this part of the work serious, definite and accurate, for only in this way can a high disciplinary value be gained for field exercises; otherwise they are apt to be vague, trifling, and uneducative. Let attention be frequently turned at all stages of the work to the controls exerted by physiographic factors upon organic life, both high and low; not because physical geography includes biology, but because it is desirable to form the habit of recognizing the close correlation that surely exists between inorganic and organic nature. Controls illustrated in the field may be verified by examples from other sources, but care should be taken to avoid petty examples on the one hand and doubtful examples on the other.

Finally, let it be remembered that this is not an outline of a course in geography, but some suggestions for one part (fall and spring field work) of a year's course on one division (physical geography) of geography. Other parts and other divisions deserve equally careful and serious attention.

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ON METHODS OF TEACHING GEOGRAPHY*

BY T. G. ROOPER, M.A., HIS MAJESTY'S INSPECTOR OF SCHOOLS.

BRITAIN has no need to fear comparison with other nations so far as exploration and commercial enterprise are concerned. In these respects no nation deserves more honor. But it must be admitted that our country falls short in one respect. In answer to the question: "What have the British done to extend the theoretical study of Geography?" the answer must be "Little or nothing." We have no such series of geographers as Humboldt, Ritter and Peschel, whose names add so much lustre to the fame of German learning.

In British schools Geography has ever been a dull and uninteresting subject. It has been a dreary recitation of names and statistics, of no interest to the learner, and of little use except, perhaps, in the sorting department of the Post Office. Yet our Consular Reports are full of reminders that British ignorance of the theory of Geography is not bliss. They point out the advantage which better informed nations possess in the keen struggle for trade. In France almost all the chief commercial centres possess Geographical Societies. As an example of the work of one of these valuable associations may be mentioned the Paris Commercial Geography Society. The following are the objects of it according to its report:

1. To place science at the disposal of commerce, and to put theory in practice;
2. To aggrandize France by developing industry and commerce abroad;
3. To receive and sift information from all parts of the world, and store up facts which may be freely drawn upon by all who can turn them to good account, whether for commerce or for theoretical study;

* Address delivered at the Annual Meeting of the Geographical Association, at the College of Preceptors, January, 1901. Reprinted by permission from the *Geographical Teacher* (London), Vol. 1, No. 1.

4. To extend the study of everything which promotes agriculture, manufacture or trade, both at home and in the colonies;
5. To show the mass of the people that they are interested in the products, export and import, of their own and other countries, and that knowledge leads to foresight, and foresight leads to power.

Surely such a society ought to exist in every large town in a commercial country like ours, and be affiliated to the Royal Geographical Society.

As nothing is so practical as sound theory, my first aim in this paper is to give some idea of the methods of studying Geography which have been devised in Germany.

Since Humboldt the improvement of the study of Geography has been attempted in several different ways. None of these methods is complete in itself, none of them is without value, and all of them ought to be present to the mind in preparing the simplest course of lessons in Geography. In briefly reviewing these methods, it must be borne in mind that each of them has been developed in great detail by some school of German writers, and that it is impossible in a short space to do more than open up a glimpse of a wide prospect.

The first is the *Analytic Method.* The student starts with the Earth as a whole, and divides it systematically into oceans and continents and countries. The Globe, as a whole, is analyzed into parts, and these are subdivided again. This plan is not suited to beginners, for it presupposes much knowledge. Moreover, this method of analyzing a subject as a whole into its parts implies a finality and completeness which is far from being yet acquired in our geographical learning. Nevertheless, even at an early stage, a child may be introduced, in a cursory way, to a globe and a map of the world. A preliminary view of the whole forest may with advantage precede a detailed study of the trees, provided it be only a means of marking out the tract that has to be studied, and not the actual method of attacking the study.

The next is the *Synthetic Method.* Proceeding on this plan, the student deals with a small part of the Earth's surface, and then adds to this a study of an adjoining part, and so on, by continuously successive additions, until the whole Globe has been mastered. It is the converse of the first method. This method ignores the fact that Geography is a living study, and that all parts of the Globe are not equally worth studying. Moreover, it nearly always happens, espe-

cially to us in the British Isles, that there is some special region of the Globe on which public attention is rivetted, and then it is important to learn about this country rather than about one whch is not marked out for any special study. Nevertheless, most teachers would deal with England, Scotland, Ireland and France in close succession, so that, by successive steps, the scholars may arrive at a comprehensive idea of Western Europe before examining more distant parts.

The third is the *Associative Method.* There are some few sciences whose field is so well defined that their subject matter is but little intermixed with other branches of learning. Such, for instance, is Geometry, and, to a great extent, Chemistry: but others, like Geography, Geology, Political Economy and the like, seem rather to be composed of parts of several sciences. If we think for a moment of sciences as circles, and then of several circles intersecting at a given point, we have the presentment of a fresh science, which differs from any one of them taken by itself, and yet is made up by the common ground which is shared by all of them. The study of Geography draws upon the sciences of Astronomy, Physics, Biology, Ethnology, Statistics, Archaeology, History, Cartography, and many more.

Because it associates several distinct sciences for a particular purpose, Geography is called an Associating Science. It links together many branches of study which are otherwise dissociated. Of course this plan does not consist in amalgamating History, Geology, Astronomy and the rest into one science under a new name. This would be absurd. Rather, it consists in showing the bearing of each of these sciences on the other in a certain sphere of study; how they depend on each other, and how they support each other in dealing with a particular range of facts.

This method seems a matter of common sense, but, like much of this nature, it was only obvious after some deep thinkers had worked it out. For want of observance of this principle, there may still be seen on some time tables lessons quite disconnected under the heads, Geography and Physical Geography.

The fourth is the *Grouping Method.* This consists in classifying geographical facts of the same kind. On this plan kindred facts and phenomena are dealt with together. One section may treat of the Capitals of the World, showing how their sites have been determined. Another section may deal with the chief Ports of the World, showing their origin and their growth or decay; another section may deal with

Glaciers; another with Islands; another with Zones of Vegetation; another with the position of Fortresses and delimitation of Frontiers, and so forth. This method is clearly not for beginners; it is only suitable for an advanced class, because it pre-supposes much knowledge. At the same time, it helps to deepen the advanced study of Geography, and there is much literature which facilitates its pursuit. Facts already known are placed in a fresh light. It connects distant places together and suggests comparison. It leads the student to search for principles and to comprehend more clearly that there are laws which underlie apparently dissociated facts and phenomena.

Elisée Reclus, for instance, has shown the curious rhythmical distribution of towns along the old highways or coach roads radiating from the capital of a country. The traveller meets with a larger town about every twenty miles and a smaller one every eight or ten. In other words, the towns are spaced according to the distance a well-loaded coach and horses could cover without stopping for lighter or more substantial refreshment. The growth of railways seems to have tended to increase the town and decrease the village. In the absence of good means of locomotion large towns arise with difficulty, and nowadays, however remote, do not remain long unprovided with a railway approach. It is this method which suggests the study of the position of towns at the foot of mountain passes, at the head of estuaries, at fords, or at places where bridges can be made over rivers.

The fifth is the *Concentric Method.* This plan consists in teaching even the youngest class a brief outline of all the Geography that it is intended the children shall study while they are in the school. The brief outline which is studied in the lowest class is expanded in the next class, and again in the next, like the gradual filling in of a slight sketch to the fullness of a photograph. This method meets the objection that it is absurd for the child to know a plan of school and the name of the next street and remain ignorant of the main features of the globe.

This procedure, the concentric, seems to me the best for studying history, because the fundamental conception of history is continuity, the continuity of a people under changing conditions of government and civilization. Disjointed stories and anecdotes and short periods do not give children that sense of a stream of time nor the perception of the dramatic unity which lie at the root of national feeling.

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As regards the elements of Geography, however, except to a very limited extent, there is no such systematic whole to be studied that the concentric method can be applied with advantage.

The sixth is the *Comparative Method.* This consists in comparing the various leading phenomena of one country with those of another. This plan has done perhaps as much as any to deepen the study of Geography. Comparison leads to the appreciation of contrasts; it leads to questioning; for example, it forces on the attention the curious parallel between Australia and South Africa, between the equatorial forests in the Western and Eastern Hemispheres, between the physical features of North and South America, between the local features of New York and Southampton as seaports. The Basin of Yorkshire Ouse or Humber certainly makes the geography of the Mississippi much more intelligible.

This method cannot be left out of account in any course of lessons on Geography, however elementary.

The last method that calls for notice is the *Constructive Method* (Ritter). This consists in teaching the scholars to draw what they are being taught. It is applicable to most of the other methods. Merely copying a map may be a useful exercise in drawing, but it does not teach much geography. The better way is for the scholars to study the wall map or small hand atlases of their own, such as Philip's Comparative Atlas, under the guidance of developing questions, and then for the scholars to give precision to their impressions by making sketch maps which illustrate special details. By commencing with the hills and river basins they may afterwards construct the country as a whole. Knowledge so built up is more likely to be correct than that which depends upon the reproduction of a whole map of a country before it has been dealt with in detail. It is best for the teacher to have a good wall map and the scholar a hand atlas, so that the scholar can follow the teacher as he demonstrates. Other interesting studies may be made on this plan. As an introduction to this work, children may be taken to a neighboring eminence, and having in their hands a "graphed" map of the locality they may mark on it in red chalk all that they can actually see around them.

Another stage of the same process is for the children to take the bearings of various objects which are in view from some eminence and construct a sketch map of the landscape that is visible before them.

Or again, children may have in their hands "graphs" of the World on Mercator's projection, and mark with red chalk all the places noted for this or that product. It is best to use a different "graph" for each product. Thus may be shown the various tea producing places, the various sugar plantations and so forth, where wool is grown, where cotton. Maps thus constructed may be used for comparison with maps which show the distribution of temperature, rainfall, etc. The reasoning which connects these phenomena is so easy that a child may follow it. What is simple is not always the less profound. Diagrams can be drawn showing the slope of a country, say from Johannesburg to Durban or from De Aar to Cape Town, or from the Bernese Oberland to the mouth of the Rhine.

The road books prepared for cyclists are most helpful. Figures which mean but little to the reader may, when presented in a graphic form, be most striking and suggestive. By use of paper ruled in squares, comparative tables of area and population may be made most interesting, and so too, the ratio of the population to area. Then again comparative tables of leading exports and imports may be made interesting, if put in a diagrammatic form. To represent varying quantities by comparative areas on squared paper is most instructive. The great advantage of this constructive work is that scholars can be taught to work out these diagrams for themselves, and in a class of scholars of ordinary intelligence, some unexpected and interesting observations are sure to be made, and even little discoveries to occur.

Graphic illustrations, says Quetenet, often afford immediate conviction of a point which the most subtle mind would find it difficult to perceive without such aid. But all studies in geography, whatever methods are employed, if they are to be interesting or suggestive, must be based upon the personal inspection of the surroundings of the school and upon observation of plans, diagrams, and maps of all that lies near the home of the children. They must learn how it is possible to indicate on paper the walk, the course of a walk which they actually take, and what they see on the road. They must learn to make a plan of their schoolroom to scale after actual measurement, a block plan of the school and playground, and a diagram of a short walk, showing the varying changes of direction and counting the number of paces between each turn, and reducing the distance by scale.

They should have, if possible, a relief map of their county or of

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the district in which they live. They should have a photograph of this relief, because it forms the best introduction to the idea of a map showing how elevated land is indicated by shading. School expeditions, extending even to a school tour, are common abroad and should be in England.

As examples of what teachers can do, there was exhibited a collection of relief maps which have been made in the West Riding. The plan of construction is to trace out the contour lines on cardboard, and cut them out so that one piece can be piled upon another, the thickness of the cardboard being taken to represent a certain height in feet. The resulting relief is finished off with plasticene or modelling clay, and from this model casts can be taken. The action of water in carving out the surface of the land and the formation of rivers and the circumstances determining their course is thus made a comparatively easy as well as an interesting study. The similarly constructed relief of the Thames basin explains its formation very well, and the relation of the system of the Thames to the Severn is shown in a way that interests even experts.

Another interesting expedition for the study of more advanced map construction in a practical way is to take a prismatic compass, and by aid of it and a scale to make a traverse of some square mile of country. The pleasure of success and the disappointment of failure when the last angular measurement is joined up with the spot at which the party has commenced operations are very keenly felt.

The chief object of all this carefully graded preliminary study in geography is to lead up to the intelligent understanding of a wall map.

A really good wall map should be an interpreter of nature. The scholar who has learnt to express natural features, including hills and dales, on a flat surface, begins with the inspection of the object and ends with the rendering of it by means of symbols or shading. The reader of a map reverses this process. He restores the natural features to his mind's eye by reasoning from the symbols on the map backwards to nature. This is impossible unless the map be very carefully drawn. The rivers must be traced to their exact source; towns must be placed exactly in position; ranges of hills must be made continuous if they are so, and if they are pierced by passes these should be shown. Table-lands should be differently indicated from chains of mountains. The art of omitting what is unessential and emphasizing what is important should be carefully practiced. Maps showing physical features should be distinct from maps showing political boundaries.

EDITORIALS

THE *New England Association of School Superintendents* in 1900 appointed a committee to make a report on the problem of improving the school geography teaching. This committee consisted of Superintendent Tarbell, of Providence, author of a well-known series of geographies, Superintendent Nash, of Holyoke, Mass., and Principal Murdock, of the Normal School, North Adams, Mass., and well known for his published suggestions on geography teaching.

The report presented by this committee in 1901, and printed in a 66-page pamphlet, is one of the most important contributions to the problem of elementary geography teaching of recent years. It should be read and digested by every advancing teacher and superintendent, and by all interested in the problems of geography teaching of all grades. Advance in the quality of geography teaching in secondary schools and colleges depends intimately upon good work in elementary schools. With the increased opportunities for teaching elementary teachers the principles of geography, and with the noticeably increased use of these opportunities on the part of the teachers, there is no reason why elementary work in geography should not improve at once.

The report mentioned is very timely, very practical, very sensible, and hence valuable. The committee considers fully the scope of geography work, its relations to other subjects in the curriculum, the aims of the work, and the best methods in general to be adopted to secure those aims. An elastic but suggestive course of study follows, and the report closes with a series of reference books and of notes on apparatus.

In some ways the report does not go as far as might be desired; but considering that the ideal can only be reached by stages, and that we must always build on the present, however bad, as a foundation, the report is of great value. No teacher need feel swamped in an unknown sea if she follows the suggestions, and yet every teacher should receive enlightenment and inspiration from the report.

ONE of the most effective ways to promote an interest among teachers and the public in the possibilities of geography work is through an exhibition showing what has recently been accom-

plished in the science, and the apparatus available at small cost for teaching the subject in schools of all grades.

In 1891 the Brooklyn Institute of Arts and Sciences collected a very large amount of geographical material which remains intact in their museum to-day. This collection received a large amount of attention in Brooklyn, and in the other cities where exhibited, and was of great service in arousing the interest of the people in geography. The collection has been added to from time to time, and is now extensively used by teachers in Brooklyn.

Three years ago the Science Museum at Springfield, Mass., was opened by a similar but smaller exhibition of geographical appliances that was extensively visited by the teachers of the vicinity, and much of which is still readily available for use in the Museum. For a number of years the New York Academy of Sciences held an annual exhibition showing the year's advance in science, and geography always received important attention therein. One of the most successful of recent exhibitions was held in December at Des Moines, Iowa, as is described in detail on p. 44 of the January number of this JOURNAL. Word has come to us from several sources as to the great value of this exhibition, one of the first to be held in the West.

The planning and conducting of such an exhibition calls for a large amount of work, and yet it is in many ways an easy task. Publishers and map and model makers are usually glad to furnish their latest products for exhibition purposes, if credit be given therefor. State surveys and commissions doing in part or wholly geographical work coöperate willingly and gladly, and thus it is nearly always possible to emphasize the materials available for illustrating local geography.

Such an exhibition should be broad in its scope, and not restricted, as is so often the case, to the field of physical geography: maps, globes, models, lantern slides, photographs, and government and state publications should have an important place. Text-books for all grades of teaching, laboratory apparatus and notebooks should be included, as should be the leading reference books and atlases for household use. A good plan would be to make up a small, well chosen reference library costing $25 or $50, that would give suggestions to librarians of town and city libraries, and to citizens desiring to improve their private libraries.

Special attention should be devoted to the results and publications of the government bureaus, in the fields of animal and plant geography, in forestry and irrigation, and in soil investigations.

The editors will be glad to give more detailed information to any who may desire to plan such an exhibition, and will be pleased to receive detailed reports of exhibitions that are held in any part of the country.

AT the meeting of the *New York State Science Teachers' Association*, held at Syracuse during the last week in December, the section of Earth Science held two meetings. The first was devoted to a consideration of the subject of Geography for Training Students in Normal Schools, and the second to the discussion of the Report of the Committee of Seven, appointed in 1900 to outline a course in physical geography for secondary schools. The committee presented a preliminary report, and was continued for one year, with the expectation that in 1902 they would report a series of laboratory exercises for high-school physical geography, and a preliminary report on a course of geography for rural elementary schools. The Committee of Seven consisted of Mr. C. F. Wheelock, Head Inspector of the Board of Regents, Albany, N. Y.; Mr. W. W. Clendennin, of the Wadleigh High School, New York City; Mr. G. H. Walden, Grammar School No. 10, Rochester, N. Y.; Professor C. Stuart Gager, New York Normal College, Albany, N. Y.; Mr. P. F. Piper, High School, Buffalo, N. Y.; Mr. Frank Carney, High School, Ithaca, N. Y.; and Professor Richard E. Dodge, Teachers College, Columbia University (Chairman). The report of both sessions will be printed in full in the proceedings of the Association.

GEOGRAPHY CURRENT

ASTRONOMY

The Planets in February.—There has been an unusually favorable opportunity for observing the planets during the past few months, when all these celestial wanderers, save two, were crowded together in one little corner of the sky. February will, however, be an unfavorable month for this kind of observations except in the cases of Venus and Mercury. The sun in his eastward motion among the stars overtook Saturn on January 9th and passed between us and Jupiter on January 10th. These two bodies, and also Uranus, now, therefore, rise before the sun; the other planets are still east of the sun, and are hence evening stars.

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Mercury comes to its greatest eastern elongation on the morning of February 3d, and during the first half of the month will not set until half an hour after the sun. Its position is changing rapidly, but a search in the evening twilight a little above the horizon and a short distance to the south of the point at which the sun sets will probably reveal it.

Venus will continue the conspicuous evening star of the southwest until the second week of the month. It has begun its rapid motion toward the sun and will pass between us and that body on February 14th. It will then become a morning star, and remain so until November 28th.

Mars is near the southwest horizon at sunset, but is too faint to be seen without a telescope.

Jupiter and Saturn are morning stars, the former rising about two hours and the latter about one and one-half hours before the sun.

Occultation of "Alpha Virginis."—The moon will pass over one conspicuous star during the month, the first magnitude star *α* Virginis. The star will disappear behind the moon at 26 minutes past three in the morning of the 26th, Washington mean time, and will reappear at 38 minutes past four. This is a phenomenon which will repay observation, especially if one has a small telescope. If the observer is far distant from Washington, the times of the beginning and end of the occultation may differ considerably from those here given, and in fact there may not be an occultation apparent at his station at all, the moon passing either above or below the star. A glance at the portion of the sky surrounding the moon at about three o'clock A. M. (Washington mean time), will probably be sufficient to indicate whether the moon will pass between the observer and the star or not. It may be remembered that it is from the suddenness with which stars disappear and reappear as the moon passes over them that the absence of an atmosphere on the moon is inferred.

CLIMATOLOGY

The Climatic Zones of Siberia.—An article by J. Y. Simpson, entitled *The New Siberia,* in the *Scottish Geographical Magazine* for January, lays emphasis upon the climatic zones of Siberia and the relations of these zones to human occupation. The country may be divided into three broad east and west zones. The tundra comes

furthest north; then the taiga or belt of virgin forest, and lastly the more open zone to the south, which is largely agricultural. Between this last zone and the southern frontier come further the steppe region and the Russian slopes of the Altai and Sayan Mountains. In the tundra the subsoil is always frozen, the surface is a swamp in summer, where lichen and moss alone can grow. The climatic difficulty in the case of the tundra zone "does not lie in the small number of degrees of heat registered in summer * * * but in the relative shortness of the summer that succeeds the long winter, and in the great extremes that are reached within so brief a period. Hence, it is not easy to imagine how—unless in the event of such circumstances as have lately made the Klondike appear to many to be a desirable place of residence—this tundra zone will ever be of service to the Russian Empire, or support a population other than that of the scant subarctic tribes to whom its wastes are home."

The belt of virgin forest overlaps the tundra on the south, and is the largest of the three zones, occupying almost half of Siberia. The climate is somewhat less rigorous than on the tundra, "but agriculture is almost entirely impracticable unless with enormous trouble in certain well-favored clearings. For the rest, it is an interminable maze of Siberian poplar, spruce, larch, cedar, fir, and pitch pine, with a dense undergrowth, a place of gloom below and silent conflict in mid-air. From the south, however, this forest belt is being slowly attacked with hatchets, and, as it were, pushed farther north, so that one day the land will support many more than the 700,000 Russians and natives who at present are resident within it."

South of this forest belt comes the more open, agricultural zone, in which cereals can be grown. Here the summer is longer, and here the Trans-Siberian Railway is destined to work a revolution by bringing in hundreds of thousands of Russian peasants to till the soil, which is often very rich,—so rich indeed in many places that thirty to forty crops may be gathered without giving any long interval for the repose of the ground.—*Bull. Am. Geog. Soc.*, XXXII., 2, 1900.

PHYTOGEOGRAPHY

Acclimatization.—The scientific and economic importance of acclimatization can scarcely be overestimated. Most of the cereals and many other plants are cultivated in regions far from their native home. If changes in climate occur, it is obvious that native plants may often be obliged to change their habits or become extinct. The

once prevalent notion that temperature is the dominating climatic factor has been gradually overthrown, and acclimatization has been shown to involve changes in relation to light and moisture as well as heat. Kövessi (*Revue Générale de Botanique,* 1901) has experimented on the acclimatization of the grape, as measured by the ripening of the wood, and concludes that moisture rather than cold prevents ripening in such a climate as that of northern France. In the favorable climate of southern France the vine frequently fails to ripen its wood, if grown in wet soils. A paper by Wren in the *Monthly Weather Review* for January, 1901, entitled "Climate and Crops," shows that the acclimatization of corn is a complex affair, involving light and moisture as well as heat. It is suggested that the reason why corn grows better in Kansas than in England may be the greater and more continued light in the former region. H. C. C.

Imports from Tropic Lands.—The total importation of sugar into the United States in the ten months ending with October, 1901, was in round numbers 1,000,000,000 pounds, valued at $100,000,000. Nearly one quarter of this came from Hawaii, and of the total importation of sugar, all but about $12,000,000 came from the tropics.

The following table of importations of tropical products into this country in the fiscal year of 1901, includes the value of all sugar, about seven-eighths of which comes from the tropics:

Sugar	$90,487,800	Cabinet woods	2,993,349
Coffee	62,861,399	Rice and rice flour	2,324,898
Silk, raw	30,051,365	Cork and manufactures	2,270,995
India rubber	28,455,383	Licorice root	1,737,097
Vegetable fibres	22,932,506	Indigo	1,402,894
Tobacco and manufactures,	19,770,526	Dyewoods	1,274,445
Fruits, etc.	19,586,703	Cinchona barks	1,025,546
Tea	11,017,876	Vanilla beans	875,229
Cotton, raw	6,787,828	Sponges	717,550
Cocoa	6,761,669	Chocolate	141,892
Gums	6,639,139	Gutta percha	130,957
Spices	3,563,109	Total	$323,810,155

ZOOGEOGRAPHY

Prevention of Malaria.—Major Ronald Ross has practically succeeded in ridding Freetown, the capital of Sierra Leone, from malarial epidemics. Malaria, yellow fever, and elephantiasis have all been sufficiently shown to be carried by tropical gnats. These are

the principal and possibly the sole means of infection; and although that has yet to be demonstrated, his "object lesson" will probably settle the doubt. The gnats in question are *Anopheles, Stegomyia,* and *Culex,* the first of which breeds in puddles, the second and third in rubbish heaps. Dr. Logan Taylor, the head of his Freetown staff, was therefore instructed to hire a body of scavengers who would drain or fill up pools and puddles in the streets, and to clear the back yards of broken bottles and buckets, empty tins, old calabashes, and so forth. The *Culex* gang, under a native headman, removed the rubbish into carts and subsequently discharged it into an assigned rubbish shoot. At the same time, they showed the larvæ to occupants of houses, and instructed them in the manner of destroying them by emptying the vessels, or by dropping a little oil on the surface of the water in which they live. By this means about fifty houses were cleaned. In less than three months the gang had visited 6,500 houses in a town of 40,000 inhabitants, and disposed of more than 1,000 cart-loads of rubbish. The effect can be imagined when it is remembered that about one-third of the tins and bottles contained larvæ during the rainy season, at which time they were destroyed. Every house had been breeding mosquitoes in its own back yard, or garden. The *Anopheles* gang had a more difficult task. The streets, yards, and gardens possessed numerous pools of rain water. Some were filled with earth, rubble and turf. Others were evacuated by cutting through the rock which contained them, or by making channels in the soft earth. Several men were specially employed in brushing out with brooms, or treating with crude petroleum or creosote, those puddles which the rest had not had time to touch.—*Scientific American,* Jan. 18, 1902.

ANTHROPOGEOGRAPHY

Wampum and Shell Articles Used by New York Indians is the title of a recent bulletin issued by the University of the State of New York, through the State Museum, being a continuation of work in the direction of local archæology and Indian history. Wampum probably obtained its widest use among the Iroquois: it was also employed by the Algonkin tribes, both east and west. It was probably little used by them until the formation of the Confederacy, because before that time the Iroquois' power was too weak to insure them an open passage to the sea and an abundant supply of shells for its fabrication. Its use culminated after the white settlement and probably the largest part of it was made by whites for use in trade. It

was, primarily, ornament, and was strung into simple strands or worked up into more complex belts and collars; it became a medium of exchange, and, as such, was received at set values by Dutch, English, and even French, as well as by Indians. Both as ornament and money the purple wampum had a higher value than the white. But the most interesting use of wampum was in the employment of belts as presents and as evidence of good faith in treaties and councils. It almost replaced all other simpler gifts and pledges. Designs woven in the belts came to have meaning, and significance was attached to the color of the beads used. All this curious history is admirably presented by Dr. Beauchamp, whose report is abundantly illustrated. All these bulletins are sold at the mere cost of printing.

In this connection we may say a few words about the Indian Museum at Albany. Half a century ago Lewis H. Morgan gathered a series of objects, representing the arts and life of the Iroquois, for the State Cabinet. A catalogue of the collection, with colored illustrations, was printed in the Annual Report of the Museum for 1852. The collection has been neglected and the greater part of it seems to have disappeared. Recently interest has revived. What is left of the Morgan collection has been re-gathered; largely through the late Mr. Richmond, a considerable quantity of archæological material has been brought together; to these have been added a collection of Iroquois objects secured by Mrs. Harriet Maxwell Converse. Of special interest in Mrs. Converse's collection are the grotesque "false faces," masks of wood, which are used in the dances and ceremonials of the false-face society; scores of these are in the collection, including many *old* ones, equals of which can never again be secured, at any outlay of money. Mrs. Converse also secured a fine collection of the silver "brooches," which were long manufactured by the Iroquois. They present a considerable range in forms, some of which appear to embody symbolism. Most interesting of all, however, are the national wampum belts long held by the official "keeper of the wampum," at Onondaga. These have recently been yielded up to the State University as custodian by official act of the Six Nations. The council at which the transfer was made took place in the State Capitol building and was a notable and dignified occasion.

F. S.

ECONOMIC GEOGRAPHY

Tunnelling Under the Hudson.—The Pennsylvania Railroad Company has decided to enter New York by tunnels under the Hudson

river, and to prolong these tunnels through Manhattan Island and under the East river to Long Island, a scheme which will cost at least $40,000,000. This great project will bring into the city the trains of the Long Island Railroad (which the Pennsylvania Company controls), and permit the through trains of the Pennsylvania from the West and South to be moved to Montauk Point, the eastern extremity of Long Island, where a port for transatlantic steamships may be established. Both companies will use a great station to be erected in New York on the tract bounded by Thirty-third Street, Thirty-fourth Street, Seventh Avenue and Ninth Avenue. This enormous building, beneath which twenty-five railway tracks will pass at a level thirty-six feet below the surface, is to be modelled after the Quai d'Orsay station of the Orleans Railway in Paris. The tunnels under the Hudson are to be constructed on a new plan. The mud and clay in the river bottom being from 75 to 100 feet deep, bridges based upon piers rising from bed rock will be built, and each bridge will be inclosed in a tight steel tube. All this will be far below the river bottom. Trains will pass through tunnels on tracks supported by piers. Under the East river the tunnels will be bored through rock. Trains will be drawn from Jersey City to the new station by electric engines, coupled on at the beginning of the tunnel. On Manhattan Island the tunnels will be so far beneath the surface that they cannot interfere with the construction of city subways.—*The Independent.*

POLITICAL GEOGRAPHY

Manufacture of Guns in China.—The clause in the Protocol prohibiting the importation of arms has resulted in starting the manufacture of arms in China on a large scale, according to the *Independent.* All the raw material required can be purchased in the open market. The various arsenals in the Yangtse valley are working full time. At Hankow, for instance, 2,000 workmen are making field guns, thousands of Mauser rifles and immense quantities of ammunition and smokeless powder. Forty thousand wooden gun stocks were recently imported, and at the present moment there are 15,000 Mausers ready for distribution. The same activity is shown at the Shanghai arsenal and elsewhere.

Chilean Boundary Question.—The recent strained relations between Chile and the Argentine hinge upon an interesting point,

which focuses attention to the migration of divides, in rapid progress at the summits of the Andes, owing to the steeper slopes and greater precipitation on the west side. Argentine claims a boundary running along the highest peaks, while Chile claims the divide as the boundary. This involves an area of 10,000 square miles, which has been claimed and colonized by Argentine. The question has been referred to King Edward for settlement.

GEOGRAPHY TEACHING

Geography in French Universities.—In the December number of *La Géographie* is published a list of the courses in geography offered in the universities of France and French-speaking lands in the first semester, 1901–2. In the fifteen universities of France, there are sixty-one courses in geography offered by twenty professors of geography and thirteen other officers of instruction, three of whom are professors in allied lines. These courses cover the field of geography well, though the subdivisions into courses on regional geography have the larger showing.

Oxford University School of Geography.—The instruction given at the Oxford University School of Geography varies from term to term and covers a broad field of work, as is shown by the following announcement of lectures for the Hilary term 1902.

"The Historical Geography of Europe": MR. MACKINDER.

"Map Projections"; "The Climatic Regions of the Globe"; "Military Topography": MR. DICKSON.

"The Regional Geography of Continental Europe"; "The British Isles"; "Types of Land Forms": DR. HERBERTSON.

"The Topography of Greece in Relation to Herodotus and Thucydides": MR. GRUNDY.

"The Period of Great Discoveries, 1486–1650": MR. BEAZLEY.

Practical work is given also in surveying and mapping in regional geography and in geomorphology.

Lectures in Boston on "The Best Methods of Teaching Geography."—The New England Conference of Educational Workers is an association of teachers in and about Boston. It is divided into several sections, each of which meets monthly for the open discussion of education in some special field, such as music or nature study. This year a series of meetings on geography has been planned by the

Chairman, Mr. Edwin F. Kimball, and the Secretary, Mr. Charles F. Merrick. Topics of broad scope and general interest are to be presented by the leading author-experts, with discussion by leading educators of the state. The meetings are held in Lorimer Hall, under Tremont Temple, at 9:30 A. M., the fourth Saturday of every month of the school year. January 25th, Mr. Alexis E. Frye, author of Frye's geographies, and formerly superintendent of Cuban Schools, spoke on "What Shall Be Taught as the Elementary Ideas in Geography." In introduction he related an experience with Cuban teachers in the days when there were no text-books for their use, and they were forced to turn to nature. Some questioned the advisability of teaching the children "theories" as to the causes of what they observed; and Mr. Frye in reply called their attention to pieces of coral he had a little before picked from a nearby raised seacliff, from which a plain of coral waste extended to the present shore, with its cliffs still in process of construction. He then led them to perceive the very evident story of the formation of the land forms of their own home, making the simplicity, truth, and value of "theories," when wisely used, apparent to them.

Dr. H. S. Tarbell will speak February 22d and May 24th, his topics being "The Teacher and the Subject," and "The Teacher and the Text-Book." Dr. J. W. Redway is announced as speaker for a later date. Several hundred teachers were present at this first meeting of the series.

GEOGRAPHIC LITERATURE

BOOK REVIEWS

Climatology and the Principles of Climatotherapy, with Description of the Health Resorts of the World.—F. Parker Weber, M.D., F.R.C.P. (London); with the collaboration for America of Guy Hinsdale, M.D., Secretary of the American Climatological Association, etc.; being Vols. III and IV of A System of Physiologic Therapeutics, edited by Solomon Solis Cohen. Cloth, 8vo. Pp. 336 and 420. Maps and diagrams 15 and 12. Philadelphia, P. Blakiston's Son & Co., 1901.

The two large volumes, whose full titles are noted above, are somewhat unique, in making a careful study of regional climates as of value in the cure or prevention of disease, and as places of pleasure resort.

The first part of Volume III is devoted to a very general discussion of the elements of climate and with equally general statements of the effects of

climate on man in health and disease. The full-page charts of the weather elements are supplied by Dr. W. F. R. Phillips, of the U. S. Weather Bureau, and are excellent examples of what such maps should be.

The latter part of Vols. III and the whole of Vol. IV are given up to the description of health resorts, going into great detail as to the special value of each resort, in the treatment of various diseases, with advice as to routes, hotels and prices as well.

Volume IV presents what is perhaps the most nearly complete account of the health resorts of America yet published. Colorado is given the highest record in America for benefiting tuberculous patients.

The best chapter in the two volumes is Chapter 29, Volume IV, on Hawaii, by Dr. Titus Munson Coan. On page 225 is a map of the rainfall of Hawaii, showing beautifully the influence of the northeast trades on the climate of the islands.

Quoting at page 225—"The Hawaiian has no word for weather. For warm and cold, wet and dry, fair and rainy, and in general for the visible phenomena of the world, he has a full nomenclature; but the generic word, a coinage of more variable climates than his own, he does not need. The Hawaiian climate, in a word, is the only tropic climate that is never oppressively hot. Its equability at comfortable temperatures, and its absolute exemption from tornadoes and cyclones distinguish it from all other warm climates of which we have record, not only from continental climates like those of California and our Southern States, but also from those of other islands."

This chapter is a real contribution to geography, and must not be overlooked in any future adequate treatment of these islands.

J. P. G.

Descriptive Geography from Original Sources: North America.—F. D. and A. J. Herbertson. London, A. & C. Black, 1901. Pp. xxxvi + 252.

The little book whose full title is noted above is one of a series of "Anthologies" on the several continents now in preparation by Dr. and Mrs. Herbertson. Comparison volumes on South America and Africa will appear shortly.

The authors have selected the best available descriptive materials in reference to the most important features of North America, and have arranged these extracts so as to consider Canada, the United States, and Mexico in turn. The book opens with an introduction devoted to a description of the geography of North America by the authors, and closes with a series of Typical Railway Journeys in the United States, followed by a Bibliography and index.

The introduction is a well-arranged and well-chosen summary of the geographical features of America. There are some errors, which are minor; but they are mainly errors that are excusable because they show inaccuracy and lack of clearness on the part of the writers whom the authors were using as guides. For instance, on p. xxvii, we find that the "flat fertile Connecticut Valley" crosses the whole New England Highland, as one might readily suppose from some of the accounts given. In the same paragraph the waterfalls of New England are credited to the "fall line," as was implied a few years ago in one of our leading school geographies. These errors are minor, and can be corrected in a later edition; but they should impress a lesson on American writers.

The descriptive material is well selected, is in general accurate, and is

serviceable. The authors have read widely, and chosen wisely, and deserve credit for their care and success. The book as a whole is a good source book for collateral reading in the upper grades, and superior to many geographical readers whose general topics are not so well chosen.

The illustrations are few, but in general well done. Could an American edition be supplied, with a goodly series of illustrations, the book ought to be well received in this country. The experiment is a new one, and is most promising as to its results when used for those continents which are less familiar to us.

R. E. D.

BOOK NOTES*

Antarctic Continent, First on the.—C. E. Borchgrevink, F.R.G.S. London, George Newnes, 1901.

An account of the British Antarctic Expedition, 1898–1900, which is of interest from the standpoint of physical geography. Pictures throughout are excellent. The following are helpful references: Ascent of a glacier, 176–178; special difficulties of travel in Antarctic regions, 206, 207, 282; birds of Antarctic regions, 208–226, 228–231; insects, 231–232; seals, 236–238; birth of an iceberg, 271–276; appearance of Victoria Land, 301; table of mean monthly temperatures, 303; Aurora Australis, 313.

Ceylan, Un Séjour dans l'ile de.—Jules Le Clercq. Paris, 1900.

This book is both interesting and instructive. Colombo, the capital of Ceylon is described in the first chapter. Chapter III treats of Pointe de Galle, almost at the southern end of the island; the beautiful scenery of Ceylon is pictured in Chapters IV, VI and VII. The reader enjoys mountain climbing in Ceylon in Chapters IX and X. Chapter XXI deals with the history of the island. The pictures are good, representing chiefly scenery, and there is a good map of Ceylon.

China, A Year in.—Clive Bigham.

Illustrations good and numerous. Three maps, one of Asia, showing railways; one of China; and one of the trans-Manchurian railway. The following pages are of special interest: The Pearl river from Hongkong to Canton, 2–3; Hankow, 27–29; Tientsin, 36–37; the Amur, 69; the Yangste-kiang, Chapter VIII; the Yellow river, Chapter XI; Admiral Seymour's expedition to relieve Peking, Chapter XIII; the railways of Asia, Chapter XV. A list of books upon China is appended.

Mount Omi and Beyond.—Archibald John Little, F.R.G.S. London, William Heinaman, 1901.

A record of travel on the Tibetan border. A book which can be rapidly read, and one which contains much of interest from the standpoint of physical geography. The picture of life is excellent, as are also the brief geographical explanations. The following references are especially interesting: Salt mining, 28–31; summit of Mt. Omi, 80; mountain climate, Chapter VI; young rivers,

*The Book Notes and References to current magazine articles are by the Teachers' Geography Club, of Boston, Mass.

117–265; through the wilderness, Chapter VII; salt traffic, 139, 140; salt wells, 266, 267; difficulties of travel on Tibetan border, 145–160; rock cascade, 164; mountain frontier of China, 170; Tibetans, 171, 179, 185, 186, 251, 253, 254; trade on the border, 182, 183, 214, 217; headwaters of the Yangste, 227, 228.

Iron, A Ribbon of.—Annette Meakin, M.B. New York, E. P. Dutton & Co., 1901.

Mostly a narrative of the personal experience of the writer, the first Englishwoman to travel on the "Great Siberian Railway." The following references may be useful: Scarcity of fruit in Siberia, 66; the Yenisei, 90–95; Irkutsk, 128; Lake Baikal and surroundings, 160–164; navigable rivers of Trans-Baikalia, 174–175; experiences with the Cossacks, 196–199; summer weather, 202; fish in Amur, 263; map of Siberian railway, 320; interesting pictures, 32, 46, 102, 112, 122, 130, 136, 158, 188, 226.

Mountains of the Moon, To the.—J. E. S. Moore, F.R.G.S. London, Hurst & Blackett.

In the opening chapters Mr. Moore explains that all the most valuable scientific facts gained on his recent expedition are reserved for another book which he intends to publish soon. This account is written to arouse a more general interest in the lake region of Central Africa.

Chapter VII contains a good description of the climate of the country, and a record of some very interesting meteorological observations at Lake Tanganyika. In Chapter XV there is an interesting account of the change effected in the drainage of the region by the volcanic dam north of Lake Kiva. Chapter XXII gives an outline of the present theory of the formation of the valleys of eastern and central Africa. In Chapter XXIV the author shows how almost impossible it is for a white man ever to exist in this country.

Parks, Our National.—John Muir. Houghton, Mifflin & Co., 1901.

There is no need of naming special chapters in this book, for it should be read from cover to cover. It gives a most valuable and interesting description of the climate, flowers, trees, birds, and animals of our national parks, and leaves one with an intense desire not only to visit but to live in Yosemite, which is the park described at greatest length. In Chapter VIII, pp. 260–267 there is a vivid account of the formation of an avalanche. Chapter IX contains a description of a fire in the Sequoias.

Sunshine and Surf.—Douglas Hall and Lord Albert Osborne. 1901.

The book noted above is written in an easy narrative style, and describes geographically what the writers found of interest in their trip through the South Seas. The illustrations are numerous. Pages containing matter of geographical value are as follows: Diving for pearl shells, 56–58; the Paumotus Islands, 82–86; the Marquesas Islands, 92–96; the Fiji Islands, Chapter XVIII; Samoan Islands, 239–242; Honolulu, 306–307.

Caribbean, The Golden.—Henry R. Blaney. Boston, 1900.

The book noted gives an account of a trip through the Caribbean Sea. The Republic of Colombia, South America, is described, and also the republics of

Central America. The most valuable pages are the following: San José and its people, 59–62; Chapter IX., Banana culture; Tegucigalpa, 93; Productions of Honduras, 94; Nicaragua and Nicaragua Canal, 106–112. The colored pictures are numerous and very attractive, showing well the contrasts between our cities and customs and those of the neighboring republics.

Alaska and the Yellowstone, Touring.—Charles M. Taylor, Jr. G. W. Jacobs & Co., Phila.

Although the author of this volume tells nothing that was not already very generally known about the region described, his manner of relating the incidents of the trip makes this book very readable. Chapters XI., XII., and XIII. are among the best in the book.

Glasgow in 1901.—J. H. Muir. W. Hodge & Co.

The writer of the work is well versed in his subject, and the book is of unusual interest and excellence for a detailed study of a city. There are many pictures. Early history of Glasgow, 33; cause of growth due to trade with America, 36; industrial revolution, 41; water system, 49–56; street cars, lighting streets, 58–61; University of Glasgow, 78–82; converting the Clyde into a port, 88–103; shipbuilding, 116–135; tea rooms, 166–178.

A Winter Pilgrimage to Palestine, Italy, and Cyprus.—H. Rider Haggard. Longmans, Green & Co., 1901.

The above book is very pleasant reading, though not of special interest to students of geography. The pictures are numerous and good. Some pages of interest are, 10, Milan Cathedral; 46, Pompeii; 75, Colossi; 190, Beirut; 200, Tyre; 207, Nazareth; 221, Sea of Galilee; 293, Jericho.

CURRENT MAGAZINE ARTICLES

Agriculture? Is There a Decadence of New England,—Charles S. Phelps. New England Magazine, November, 1901. Pp. 374–383.

A study of the decline of agriculture viewed in the light of our entire industrial development as a nation. First reason of the decline, that farmers originally did not depend wholly upon the products of the soil, but were also manufacturers on a small scale; but as manufacturing is now centered in large plants they must gain livelihood from the direct products of farm, 374–375. Second reason, the unnatural inflation of prices occasioned by the Civil War. Third, the rapid development of the West by throwing open large areas of free lands. Fourth, the growth of the cities; use of steam instead of water power; extension of railroads, etc., 375. Farmers in New England now concentrating along a few lines, conducting their farms on the intensive and not extensive scale, 376–379. Farmers to-day making use of teachings of science, 380–382. New England agriculture showing a gradual transition toward better things.

Clunie.—Arthur Colton. Harper's Magazine, January, 1902. Pp. 218–225.

A well illustrated description of a recent journey to the neighborhood of Caledonian Canal, familiarly told and chiefly valuable for its pictures of Scotch scenery.

Eskimo Noah's Ark, The.—Rene Bache. Harper's Weekly, December 14, 1901. P. 1277.

An article suitable for children to read. Seven good illustrations, giving ideas of Eskimo child life.

Germans, Toy Making Among the.—Fritz Morris. Harper's Weekly, December 14, 1901. P. 1277.

An illustrated article on one of Germany's staple industries—would be interesting for children. England and United States largest purchasers; Nuremburg and Furth the centres of this industry; the manufacture and clothing of dolls; other toys.

Indian, What the Basket Means to the.—Neltje Blanchan. Everybody's Magazine, November, 1901. Pp. 561–570.

A well-illustrated and very interesting description of the baskets of the Indians and of their meaning. Might be read with interest by pupils. The basket as a contribution to civilization by primitive woman; great beauty put into cooking utensils with great poverty of material, 499; shapes and uses, 562–565; the different patterns symbolic, 567.

Mine. The Extraordinary Story of the Utica.—Baily Millard. Everybody's Magazine, November, 1901. Pp. 499–514.

A history of a mine in the Sierras; chiefly valuable for its twenty-three good pictures of mining.

River, Electric Cars on a Frozen.—Harper's Weekly, December 28, 1901. P. 1330.

A good picture of the frozen Neva River, with cars running on substantial tracks. St. Petersburg in the distance.

Sahara, The Pompeii of the.—Percy Barker. Munsey's Magazine, January, 1902. Pp. 505–512.

An illustrated account of Timgad in Algeria, a city which fifteen centuries ago was the Roman Thamugas, a community of fifty thousand people, with temples and monumental arches, markets and baths, and a spacious theatre. History of Timgad, 508; in the streets, 509; a Roman market place, 510.

West, Conveying Water in the. (Central Washington.)—Harper's Weekly, December 21, 1901. P. 1319.

A short article with a very good picture of the siphon of the Yakima Valley Canal. The picture illustrates a new method of conducting water across a narrow valley, the barren character of the country, and a small tract of land just put under cultivation.

Argentine Republic, A Visit to the.—G. Shaw Lefevre. Nineteenth Century Mag., November, 1901, pp. 830–843.

British investments in industrial concerns enormously great; population of Buenos Aires doubled during last ten years, there being 25,000 English people living there. Employment of Italians who cross the ocean for the harvest and return to Italy when it is over. Great economic development in the coun-

try; production and export of wheat; alfalfa grass and its uses; Germany and United States dangerous competitors in the Argentine markets.

Colorado Springs and Round about Pikes Peak.—Francis Walker. New England Mag., October, 1901, pp. 236–248.

An illustrated article descriptive of the scenery and history of Colorado Springs and Pikes Peak; prominent people who have lived there.

SOCIETIES

The Geographic Society of Chicago, Miss Zonia Baber, President, and Miss Louella Chapin, Secretary, announces an interesting roster of lectures for the winter and spring of 1902. On January 25 Professor Rollin D. Salisbury gave an illustrated lecture on the Grand Canyon of the Colorado. Other lectures announced for the season are: "The Teaching of Commercial Geography," by Dr. Henry R. Hatfield; and a course of five lectures by Dr. George A. Dorsey, on "The Relation of Geographical Environment to the Development of Human Culture," with the following subjects: The Arctic Region and the Eskimo; The North Pacific and Northwest Coast Tribes; The Prairie and Great Plains Tribes; The Arizona Desert and the Pueblo Dwellers; Peru, its Coast and Plateau, and the Incas.

Field excursions for the members of the Society are planned for Thornton, Illinois, May 17; Savanna, Illinois, May 29–31; and on June 13 to the Hawthorne and Elmhurst Quarries, Chicago.

National Geographic Society.—The meeting of January 10th was devoted almost wholly to business affairs. The following gentlemen were elected to serve as Managers for the ensuing three years: Alexander Graham Bell, Henry Gannett, A. W. Greely, Angelo Heilprin, Russell Hinman, W J McGee, Gifford Pinchot and Otto H. Tittman. The Secretary's report showed an increase in membership, the total being over 2,600.

At the meeting of January 24th Dr. L. A. Bauer, in charge of the Division of Terrestrial Magnetism, U. S. Coast and Geodetic Survey, gave an account of the magnetic survey of the United States now being prosecuted. The importance of an accurate knowledge of the variation of the magnetic compass was dwelt on at some length. The Survey is beginning on a complete study of Magnetic varia-

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tion throughout the United States and the publication of the results in such form as shall be most useful to those interested. Stations about 25 miles apart have been established for the purpose of ascertaining the compass variation, while four magnetic observatories have been installed at the following named places, viz., Cheltenham, Md.; Baldwin, Kan.; Sitka, Alaska, and Honolulu, Hawaii. At these observatories complete records of all the magnetic elements will be obtained.

The second paper of the evening was by Mr. James Page of the Hydrographic Office, Navy Department, on "Ocean Currents." Mr. Page showed that an intimate relation existed between the general atmospheric circulation and the system of ocean currents, and that the latter were due directly or indirectly to the frictional action of the wind. The rate of drift of ocean currents varies greatly; in extreme cases it might be as much as 75 to 100 miles in 24 hours, but generally it is very much less, not more than twenty to thirty miles in 24 hours.

A. J. HENRY,
Secretary.

NEWS NOTES

PROFESSOR W. W. ROWLEE of Cornell University, and Professor J. C. Gifford of the New York College of Forestry have gone on an expedition to Cuba and the Isle of Pines to study the botany and the forest conditions of those islands.

AT the annual meeting of the Geographical Association (Britain), the Right Hon. James Bryce, M.P., gave a lecture on the "Importance of Geography in Education." It is hoped that the address may appear in whole or in part in a later number of THE JOURNAL, together with a report of the Association for the last year.

AMONG the prizes awarded by the Paris Academy of Sciences for 1901, the Gay prize in physical geography has been divided between Messrs. Franchet and Saint-Yves for their study of the distribution of Alpine plants. Franchet's work was on the Alpine plants of Asia, while Saint-Yves presented a general treatise on the Alpine plants of the old world.

THE Council of the American Geographical Society, on the 9th of January, awarded the Cullum Geographical Medal (gold) to Dr. A. Donaldson Smith, of Philadelphia, for his explorations in Somali-

land and from Lake Rudolf to the Nile. Previous awards of the medal have been: to Robert E. Peary, for establishing the fact of the insularity of Greenland; to Fridjof Nansen, for voyage in the *Fram* and farthest north (86 deg. 14 min.); to Sir John Murray, oceanographer; to T. C. Mendenhall, for services to geography as head of the Coast and Geodetic Survey. The Society has also elected Professor Mendenhall to Honorary Membership.

GREAT changes have been made among the negroes of German East Africa. They now use plates, cups, glasses, saucers, looking-glasses, spoons, knives, umbrellas and occasionally clocks; they call for soap and for kerosene. In their market places they are seen drinking tea, with sugar, at table. The women have adopted European clothes, and make use of sewing machines, even in the interior districts.

J. E. SPURR, of the United States Geological Survey, is making a survey of Macedonia and Albania at the request and expense of the Sultan of Turkey.

IT is estimated that there are at present about 300,000 domestic ostriches in South Africa.

THE French Government is so much interested in the briquettes of petroleum used as a substitute for coal that it has ordered that all the petroleum used for this purpose for the present be admitted free of duty.

FOR using the Polish word "zobe" instead of the German word "hier," an officer in the Austrian army has just been sentenced to six months' imprisonment on bread and water.

PROFESSOR N. M. FENNEMAN, an associate editor of the JOURNAL, who has been for some time a student and teacher at the University of Chicago, has now taken up his work as professor of geology at the University of Colorado, Boulder, Colo. He was appointed to the new chair in the University in the summer of 1901.

THE first number of *Forestry and Irrigation* has appeared. This journal is a result of the combination of *The Forester* and *National Irrigation*. One of the features of the new and enlarged periodical is to be an increase in the number of illustrations.

Plant World and other journals have had considerable to say of late concerning the preservation of our native plants. The Misses

Olivia and Caroline Phelps Stokes have presented to the Board of Managers of the New York Botanical Garden the sum of $3,000, the interest on which is to be used for the furtherance of the best means to preserve native plants that are in danger of extermination.

PROFESSOR R. A. PHILIPPI, who has for so many years been identified with botanical study in Chile, has been elected director of the International Academy of Geographic Botany.

DR. D. T. MACDOUGAL is spending February in Arizona and Sonora collecting tree cacti and other desert plants for the greenhouses of the New York Botanical Garden.

IN the reorganized *Botanisches Centralblatt*, which is to be the general reference organ of the newly formed International Association of Botanists, phytogeography has secured a somewhat inadequate place on the immense editorial board. Professor Flahault of Montpellier is the phytogeographic editor for France, Professor Warming of Copenhagen for Scandinavia, and Professor Schroeter of Zürich for Switzerland. The botanists of other countries have as yet made no special place for this large and important field.

H. C. C.